

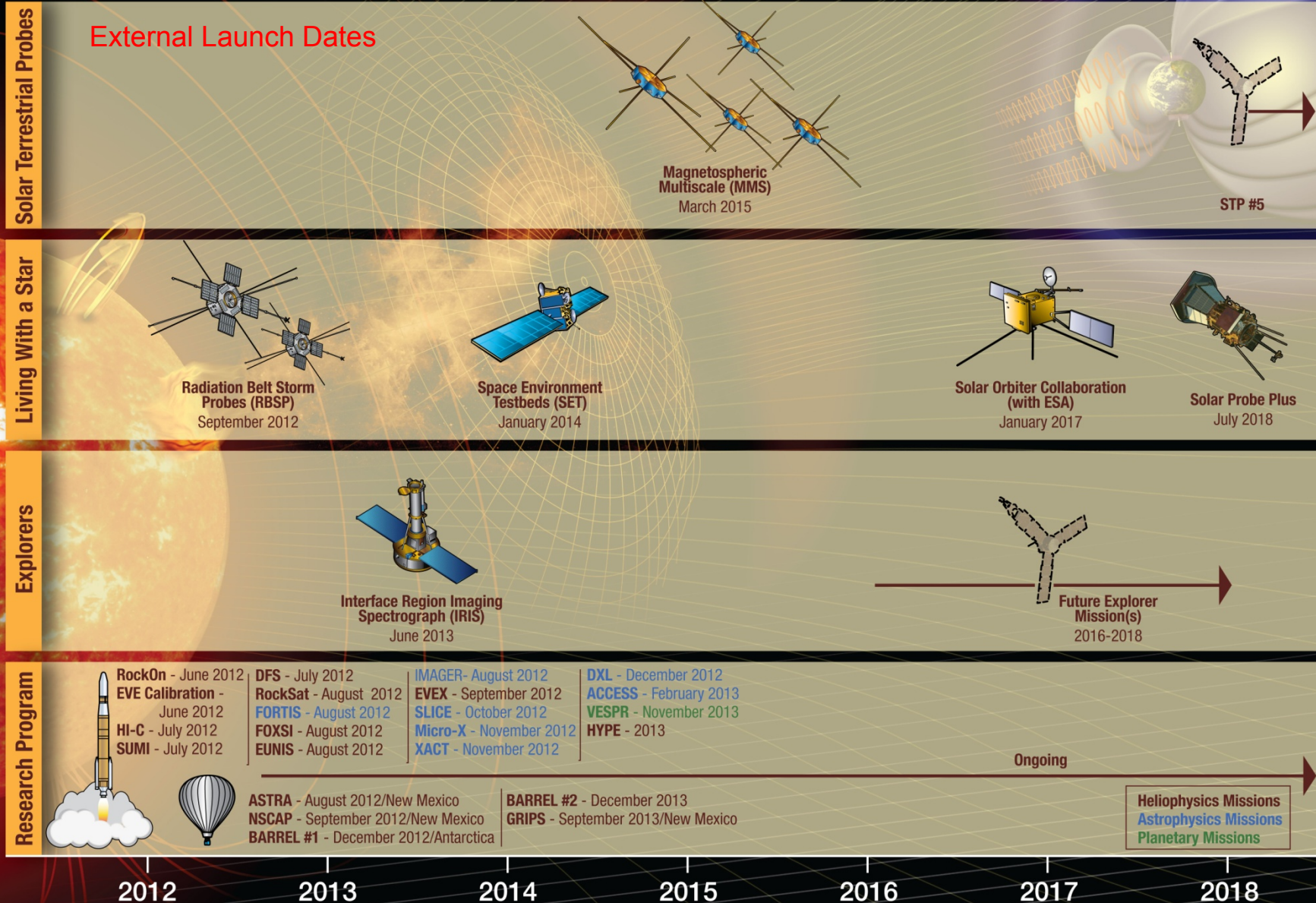


January 15, 2012

Heliophysics

Presentation to
Heliophysics Subcommittee
July 2, 2012
Vicki Elsbernd

Heliophysics Program 2012-2018



Living With a Star Program

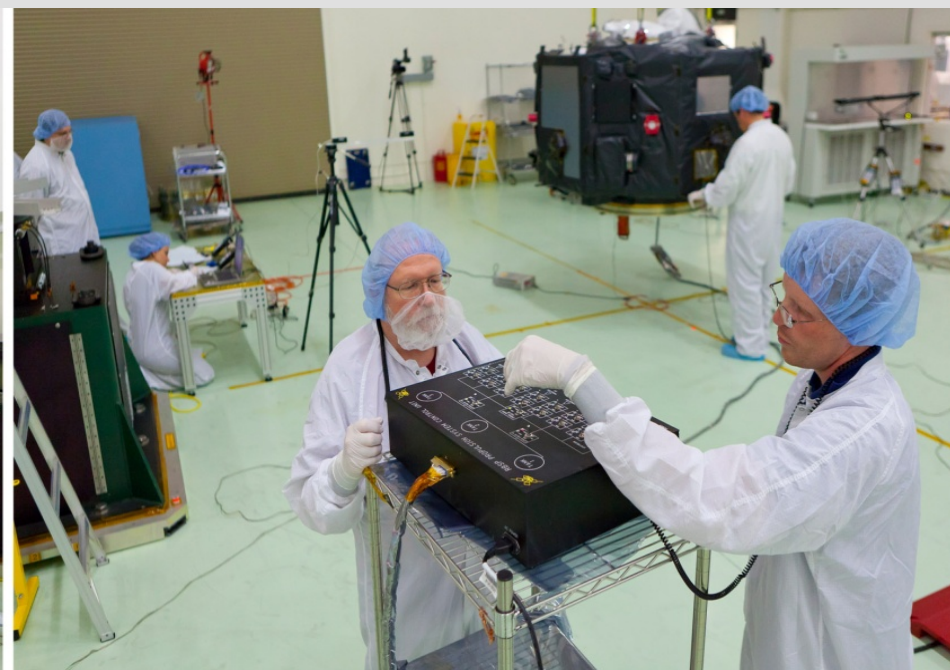


Project	Overall previous months				This Month					
	-4	-3	-2	-1	O	C	S	T	P	
<u>OVERALL</u>	G	G	G	G	G	G	G	G	G	
RBSP Aug 23 LRD	G	G	G	G	G	G	G	G	G	Shipped to KSC May 1. Undergoing final launch preparations.
SOC 2017	G	G	G	G	G	G	G	G	G	JPIP signed; back-up launch periods being analyzed
SET-1 2014	G	G	G	G	G	G	G	G	G	Workmanship TVAC completed; in storage until December
BARREL 2012	G	G	G	G	G	G	G	G	G	On track to deliver 25 payloads for Dec 2012 campaign
SPP 2018	G	G	G	G	G	G	G	G	G	Phase B subcontracts being finalized.

- **RBSP** – At Astrotech. All flight hardware is now on the observatories. Mission Readiness Review scheduled for July 20; Mission Readiness Briefing July 31



RBSP Spacecraft During Final Magnetic Swing Tests





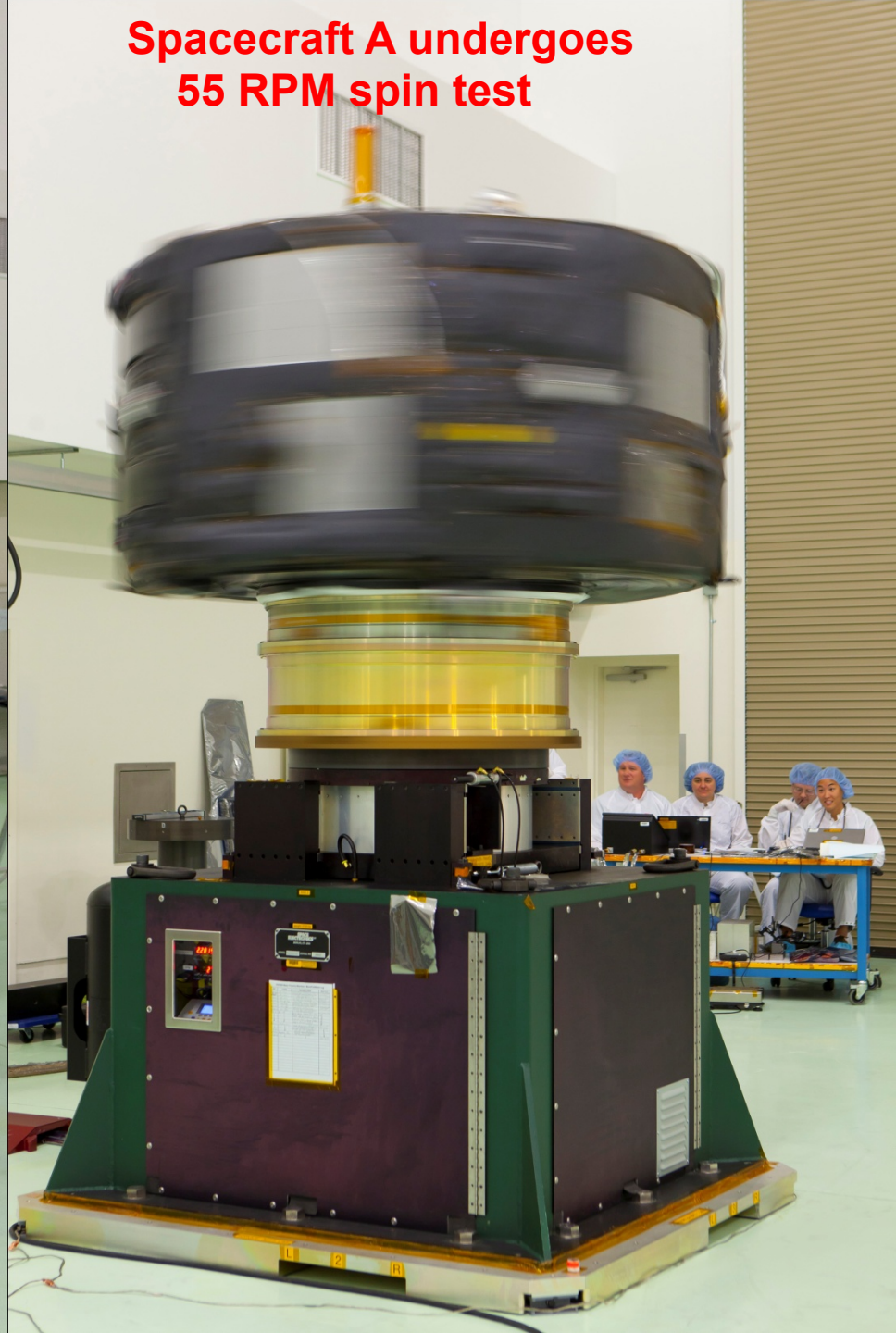
RBSP Solar Arrays Undergo White Light & Black Light Cleaning





**RBSP Spacecraft A being lifted
to the spin table**

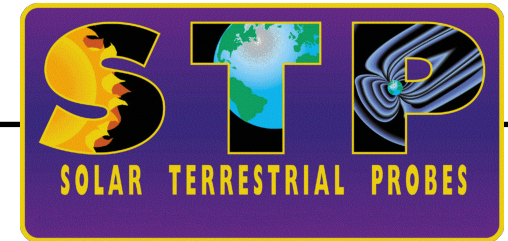
**Spacecraft A undergoes
55 RPM spin test**





Ribbon cutting at KASI for the RBSP space weather beacon data antenna

Solar Terrestrial Probes Program



Project	Overall previous months				This Month				
	-4	-3	-2	-1	O	C	S	T	P
<u>OVERALL</u>	G	G	G	G	G	G	G	G	G
Magnetospheric Multiscale (MMS) Internal LRD now 10/2014	G	G	Y	Y	Y	Y	G	Y	Y
STP#5	G	G	G	G	G	G	G	G	G
									Replan memo allows project to assume release of portion of UFE; DPMC / KDP-D to address this in Sept/Oct. Failed capacitors during Navigator RF card testing due to workmanship. Board level screening process underway.
									Decadal Survey will set science goal; competition to follow

- HQ authorized replan resulting from conflicts with JWST for GSFC Thermal Vac chamber. MMS has baselined Thermal Vac testing at NRL.
- Mission System Integration Review (SIR) planned for the week of August 27, 2012
- Observatory #1 System I&T starts in September 2012

O: overall C: Cost, S: Schedule, T: Technical, P: Programmatic



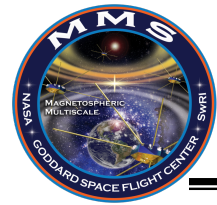
On plan,
adequate
Margin**



Problems, working
to resolve within
planned Margin**

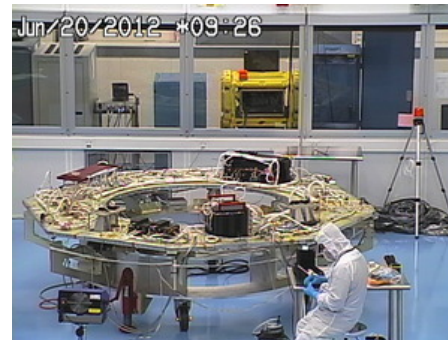


Problems, not
enough margin
to recover**



MMS Significant Accomplishments

- Over the last several months, significant progress has been made leading to the SIR in August
- Integration of the 1st Spacecraft Bus and 1st Instrument Suite is ongoing and good progress continues in all areas.
 - Flight units for Observatories 1 thru 4 proceeding thru various stages of assembly and acceptance testing with Observatory #1 subsystems and instruments now arriving to I&T regularly
- **Recent Highlights:**
 - 1st run Functional Test of Spacecraft #1 completed
 - Propulsion Module FM#1 completed proof pressure testing and is now in MMS cleanroom being prepared for installation on Spacecraft #1
 - FPI DIS FM#1 calibrated and delivered to GSFC



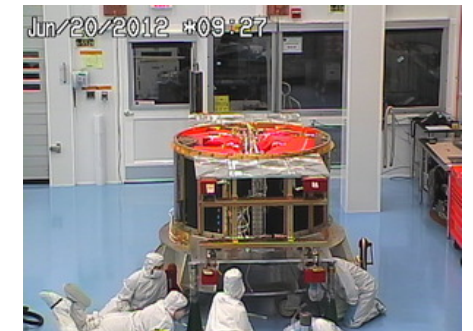
SC#1 at GSFC MMS



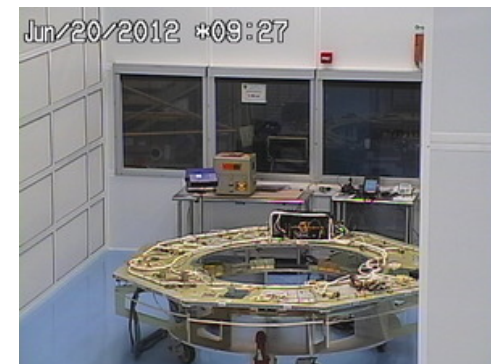
IS#1 at GSFC SCA



PropFM#2 at GSFC B11



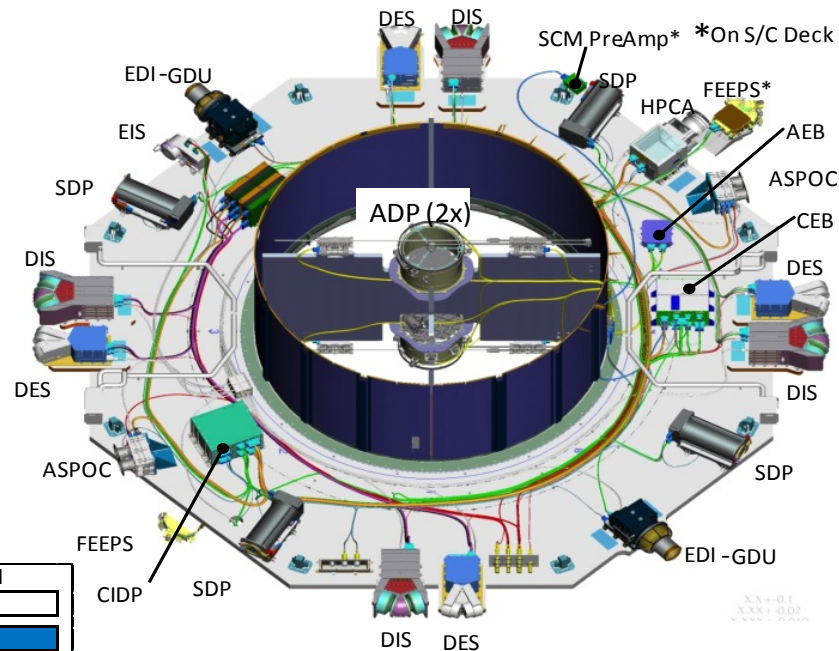
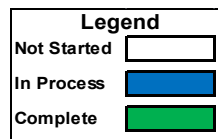
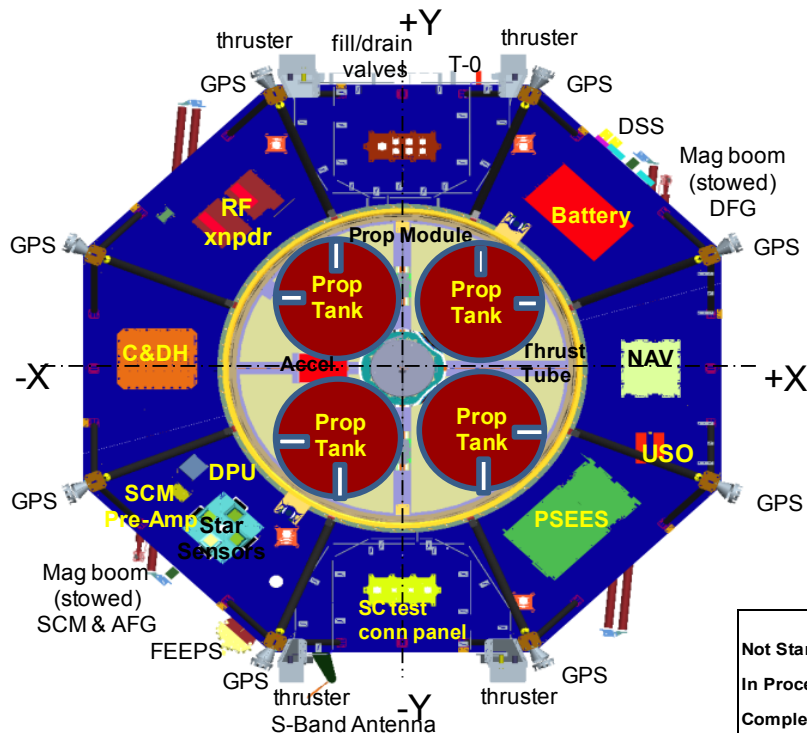
PropFM#1 at GSFC MMS



SC#2 at GSFC MMS

MMS Observatory #1 Status

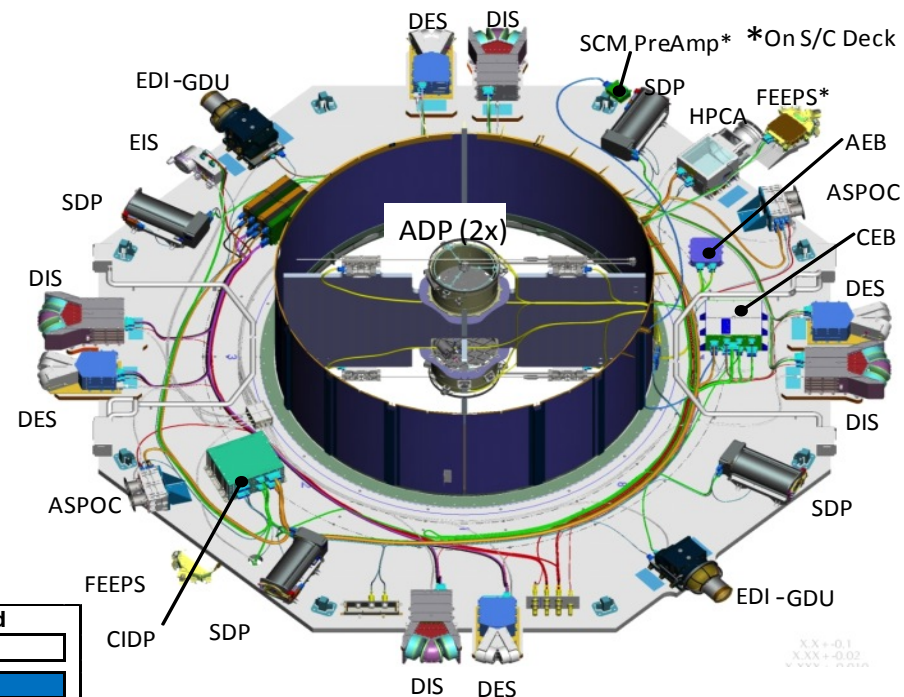
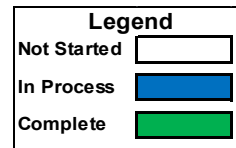
IS Status as of: 04/30/12
SC Status as of: 05/31/12


































































Observatory #1 Hardware						
	Assy	Test/Del.	Obs Integr.		Assy	Test/Del.
Spacecraft Deck			01/12/12	Accelerometer		08/21/12
Harness			01/12/12	FSW Build 3.6		08/29/12
PSEES			02/10/12	Instrument Suite		09/11/12
C&DH			03/23/12	GPS Antenna		10/04/12
I&T Battery			04/04/12	Front End Electr.		10/04/12
Star Sensor/OB			04/30/12	Mag Boom		12/21/12
RF Transponder			05/03/12	S-Band Antenna		02/05/13
Dig. Sun Sensor			05/14/12	Solar Array		02/15/13
Propulsion Module			06/25/12	Thrust Tube**		10/05/11
Navigator (incl USO)			08/02/12	Thruster Assy**		10/20/11
				Propellant Tank**		03/16/12
				** Integrate to Propulsion Module		





































Instrument Suite Components						
	Assy	Test/Del.	IS Integr.		Assy	Test/Del.
Instrument Deck			DES			06/22/12
Instrument Harness			CEB			06/07/12
CIDP			06/15/12	AEB		06/12/12
EIS			05/11/12	AFG		06/12/12
ASPOC			06/01/12	DFG		06/12/12
FEEPS*			06/28/12	SCM & Pre-Amp		06/12/12
HPCA			05/23/12	SDP		08/13/12
IDPU			06/14/12	EDI-GDU		08/07/12
DIS			07/03/12	ADP*		11/23/12
*ADP Integrated onto S/C Bus						
*1 FEEPS on IS Deck & 1 on SC Deck						

06/14/2012
IS Status as of: 04/30/12
SC Status as of: 05/31/12



<u>Observatory #2 Hardware</u>								
	Assy	Test/Del.	Obs Integr.		Assy	Test/Del.	Obs Integr.	
Spacecraft Deck				FSW Build 3.6				
Harness				Instrument Suite				
PSEES				GPS Antenna				
C&DH				Front End Electr.				
I&T Battery				Mag Boom				
Star Sensor/OB				S-Band Antenna				
Dig. Sun Sensor				Solar Array				
RF Transponder								
Propulsion Module				Thrust Tube**				
Accelerometer				Thruster Assy**				
Navigator (incl USO)				Propellant Tank**				

** Integrate to Propulsion Module

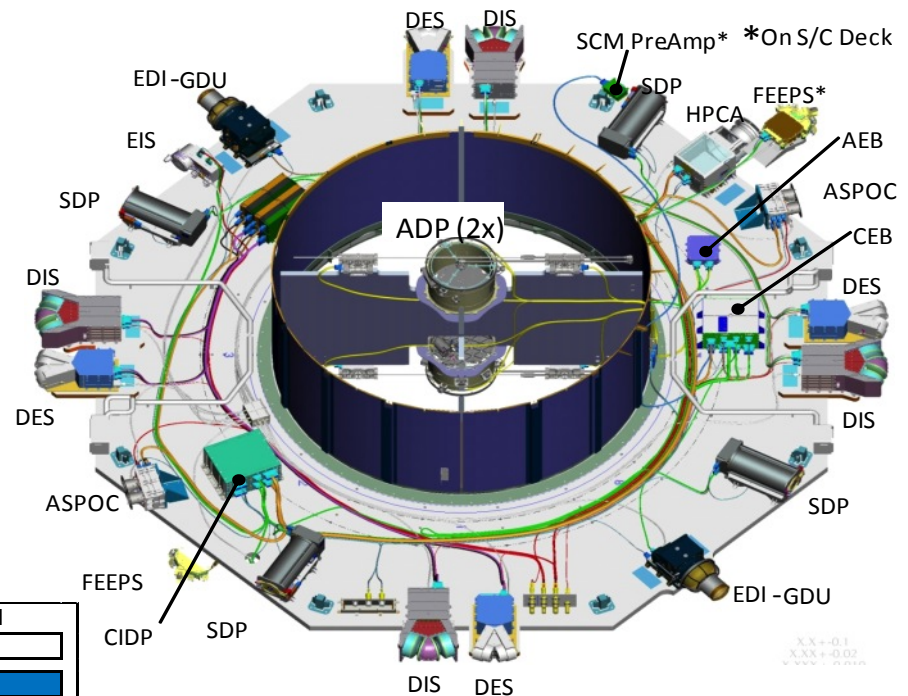
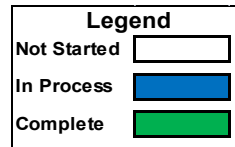
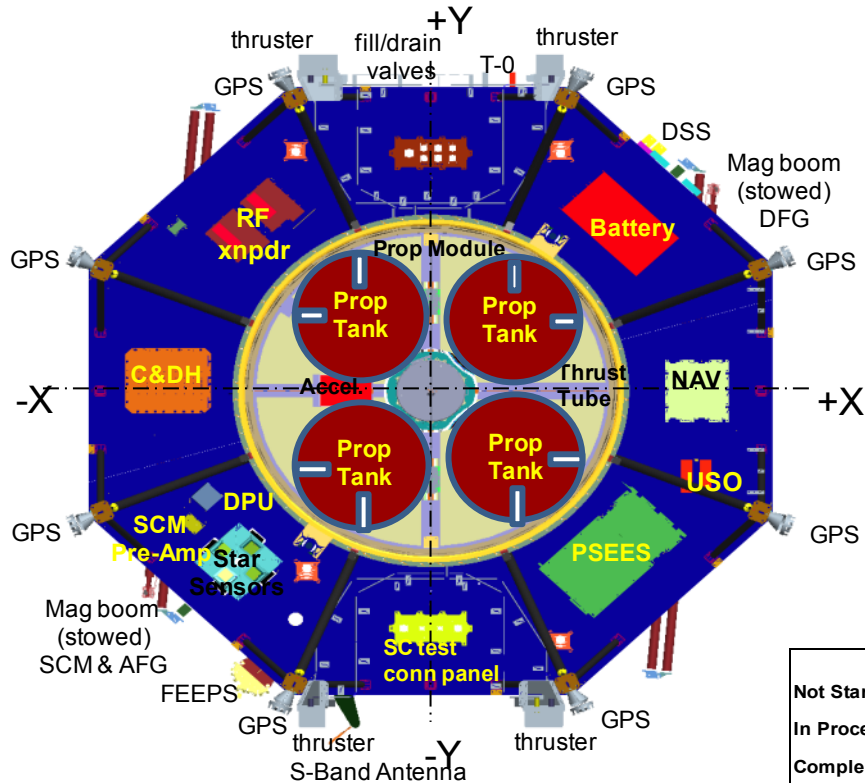
Instrument Suite Components							
	Assy	Test/Del.	IS Integr.		Assy	Test/Del.	IS Integr.
Instrument Deck			11/15/12	DES			10/12/12
Instrument Harness			06/08/12	CEB			09/10/12
CIDP			08/23/12	AEB			09/13/12
EIS			08/30/12	AFG			09/17/12
ASPOC			09/04/12	DFG			09/17/12
FEEPS*			09/06/12	SCM & Pre-Amp			09/18/12
HPCA			09/07/12	SDP			09/24/12
IDPU			10/04/12	EDI-GDU			10/01/12
DIS			10/30/12	ADP*			01/25/13

*ADP Integrated onto S/C Bus
*1 FEEPS on IS Deck & 1 on SC Deck

11

MMS Observatory #3 Status























































06/14/2012
IS Status as of: 04/30/12
SC Status as of: 05/31/12



Observatory #3 Hardware

	Assy	Test/Del.	Obs Integr.		Assy	Test/Del.	Obs Integr.
Spacecraft Deck	<div></div>	<div></div>	08/15/12	FSW Build 3.6	<div></div>	<div></div>	02/19/13
Harness	<div></div>	<div></div>	08/24/12	Instrument Suite	<div></div>	<div></div>	02/22/13
PSEES	<div></div>	<div></div>	09/13/12	GPS Antenna	<div></div>	<div></div>	04/08/13
C&DH	<div></div>	<div></div>	09/21/12	Front End Electr.	<div></div>	<div></div>	04/08/13
I&T Battery	<div></div>	<div></div>	10/01/12	Mag Boom	<div></div>	<div></div>	05/22/13
Star Sensor/OB	<div></div>	<div></div>	10/10/12	S-Band Antenna	<div></div>	<div></div>	07/02/13
RF Transponder	<div></div>	<div></div>	10/19/12	Solar Array	<div></div>	<div></div>	07/17/13
Dig. Sun Sensor	<div></div>	<div></div>	10/24/12				
Navigator (incl USO)	<div></div>	<div></div>	12/31/12	Thrust Tube**	<div></div>	<div></div>	07/25/12
Propulsion Module	<div></div>	<div></div>	01/14/13	Thruster Assy**	<div></div>	<div></div>	08/30/12
Accelerometer	<div></div>	<div></div>	02/11/13	Propellant Tank**	<div></div>	<div></div>	10/29/12
				** Integrate to Propulsion Module			

Instrument Suite Components

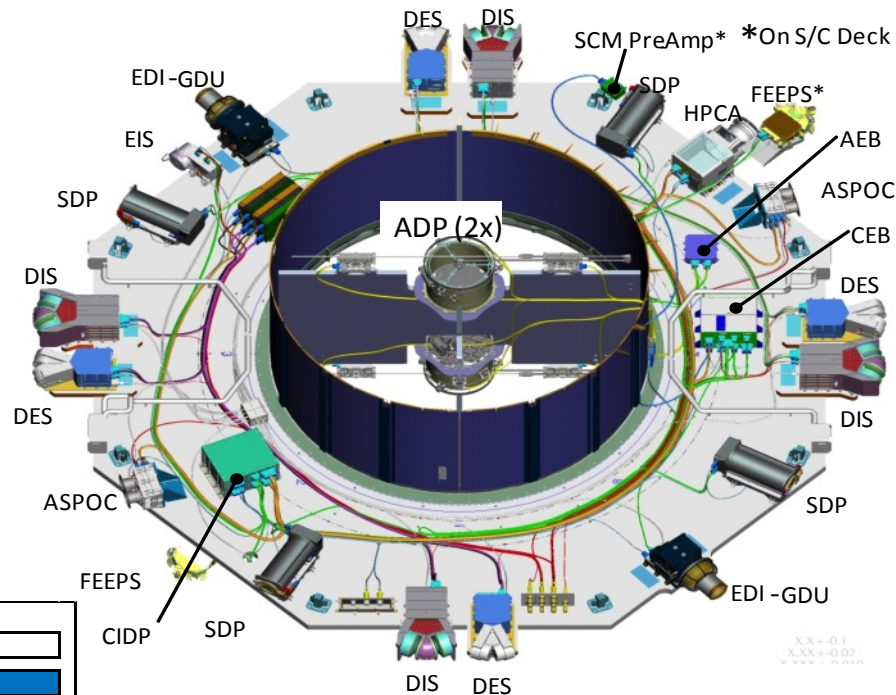
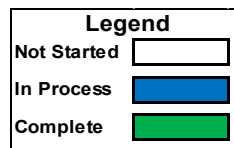
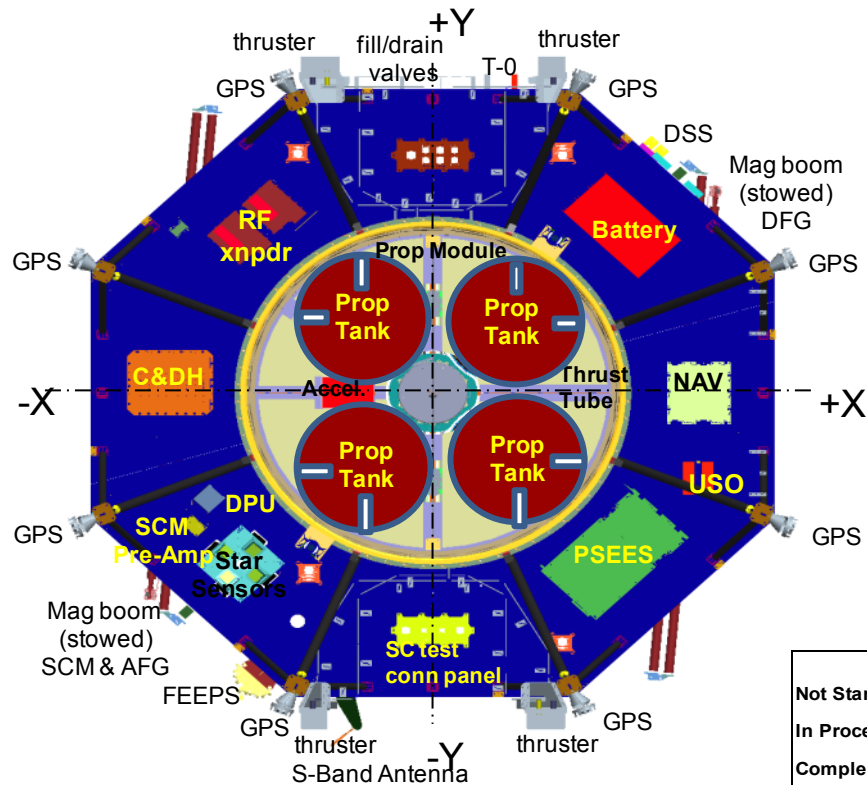
	Assy	Test/Del.	IS Integr.		Assy	Test/Del.	IS Integr.
Instrument Deck				DES			
Instrument Harness				CEB			
CIDP				AEB			
EIS				AFG			
ASPOC				DFG			
FEEPS*				SCM & Pre-Amp			
HPCA				SDP			
IDPU				EDI-GDU			
DIS				ADP*			

*ADP Integrated onto S/C Bus

*1 FEEPS on IS Deck & 1 on SC Deck

MMS Observatory #4 Status

06/14/2012
IS Status as of: 04/30/12
SC Status as of: 05/31/12



Observatory #4 Hardware

	Assy	Test/Del.	Obs Integr.		Assy	Test/Del.	Obs Integr.
Spacecraft Deck	<input type="checkbox"/>	<input type="checkbox"/>	10/22/12	FSW Build 3.6	<input type="checkbox"/>	<input type="checkbox"/>	03/29/13
Harness	<input type="checkbox"/>	<input type="checkbox"/>	10/31/12	Instrument Suite	<input type="checkbox"/>	<input type="checkbox"/>	05/08/13
PSEES	<input type="checkbox"/>	<input type="checkbox"/>	11/19/12	GPS Antenna	<input type="checkbox"/>	<input type="checkbox"/>	6/14/13
C&DH	<input type="checkbox"/>	<input type="checkbox"/>	11/28/12	Front End Electr.	<input type="checkbox"/>	<input type="checkbox"/>	06/14/13
I&T Battery	<input type="checkbox"/>	<input type="checkbox"/>	12/07/12	Mag Boom	<input type="checkbox"/>	<input type="checkbox"/>	08/05/13
Star Sensor/OB	<input type="checkbox"/>	<input type="checkbox"/>	12/14/12	S-Band Antenna	<input type="checkbox"/>	<input type="checkbox"/>	09/13/13
RF Transponder	<input type="checkbox"/>	<input type="checkbox"/>	12/27/12	Solar Array	<input type="checkbox"/>	<input type="checkbox"/>	09/26/13
Dig. Sun Sensor	<input type="checkbox"/>	<input type="checkbox"/>	01/02/13				
Navigator (incl USO)	<input type="checkbox"/>	<input type="checkbox"/>	01/10/13	Thrust Tube**	<input type="checkbox"/>	<input type="checkbox"/>	09/12/12
Propulsion Module	<input type="checkbox"/>	<input type="checkbox"/>	02/25/13	Thruster Assy**	<input type="checkbox"/>	<input type="checkbox"/>	10/19/12
Accelerometer	<input type="checkbox"/>	<input type="checkbox"/>	03/22/13	Propellant Tank**	<input type="checkbox"/>	<input type="checkbox"/>	12/14/12

** Integrate to Propulsion Module

Instrument Suite Components

	Assy	Test/Del.	IS Integr.		Assy	Test/Del.	IS Integr.
Instrument Deck	<input type="checkbox"/>	<input type="checkbox"/>	05/08/13	DES	<input type="checkbox"/>	<input type="checkbox"/>	04/08/13
Instrument Harness	<input type="checkbox"/>	<input type="checkbox"/>	12/13/12	CEB	<input type="checkbox"/>	<input type="checkbox"/>	03/14/13
CIDP	<input type="checkbox"/>	<input type="checkbox"/>	01/23/13	AEB	<input type="checkbox"/>	<input type="checkbox"/>	03/19/13
EIS	<input type="checkbox"/>	<input type="checkbox"/>	03/05/13	AFG	<input type="checkbox"/>	<input type="checkbox"/>	03/20/13
ASPOC	<input type="checkbox"/>	<input type="checkbox"/>	03/08/13	DFG	<input type="checkbox"/>	<input type="checkbox"/>	03/19/13
FEEPS*	<input type="checkbox"/>	<input type="checkbox"/>	03/12/13	SCM & Pre-Amp	<input type="checkbox"/>	<input type="checkbox"/>	03/20/13
HPCA	<input type="checkbox"/>	<input type="checkbox"/>	03/13/13	SDP	<input type="checkbox"/>	<input type="checkbox"/>	03/26/13
IDPU	<input type="checkbox"/>	<input type="checkbox"/>	03/27/13	EDI-GDU	<input type="checkbox"/>	<input type="checkbox"/>	04/19/13
DIS	<input type="checkbox"/>	<input type="checkbox"/>	04/22/13	ADP*	<input type="checkbox"/>	<input type="checkbox"/>	07/08/13

*ADP Integrated onto S/C Bus

*1 FEEPS on IS Deck & 1 on SC Deck

Heliophysics Explorer Program



Project	Overall previous months				This Month					
	-4	-3	-2	-1	O	C	S	T	P	
<u>OVERALL</u>	G	G	Y	Y	G	G	Y	G	Y	
IRIS LRD 1/22/13	Y	Y	R	R	G	G	Y	G	G	KDP-D completed. Additional \$13.1M UFE approved to Project.
EX/MO - next	G	G	G	G	G	G	G	G	G	CSRs due September 2012 / Review planning underway for downselect in Spring 2013.

- **Interface Region Imaging Spectrograph (IRIS)**
- SIR/PER successfully completed on June 5. Very positive report from the SRB.
- KDP-D held June 27. Cost and schedule reserves restored.
- IRIS launch readiness date moved from December 1, 2012 to January 22, 2013.
- COMM System from SpaceMicro Status: All S-Band flight boards have been received. Planned delivery of the flight model is acceptable, but is very tight. Could still impact LRD.

O: overall C: Cost, S: Schedule, T: Technical, P: Programmatic



On plan,
adequate
Margin**



Problems, working to
resolve within
planned Margin**



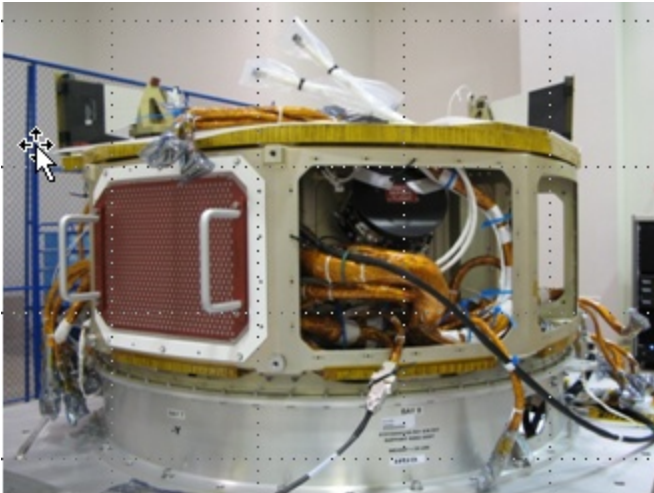
Problems, not
enough margin to
recover**



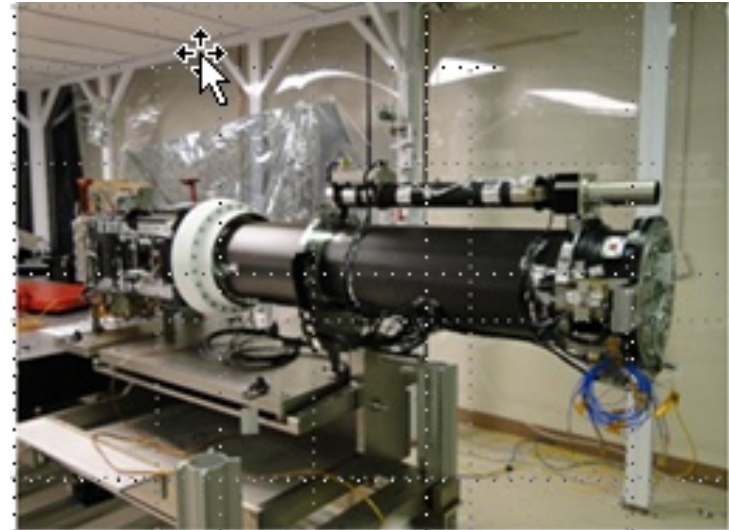
IRIS Significant Progress

STATUS AS OF:06/25/12

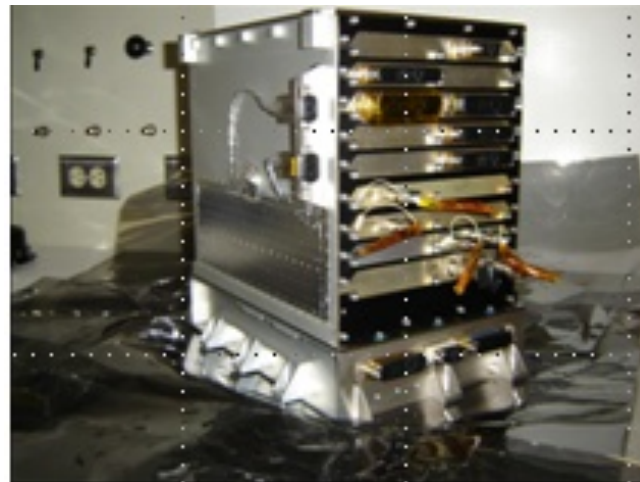
S/C Bus now in bake out.



Instrument In prep for ThVac



- Instrument completed a very successful CPT#1. Now in Thermal Vac.
- All parts in house for construction of "S" Band flight unit.
- Build of COMM "X" Band completed.



Instrument Electronics Box prepped for ThVac

Operating Missions

Mission	Launch	Phase	Extension to (*)	M-3	M-2	M-1	Cur. M.	Remarks
Geotail	7/24/92	Extended	9/30/2014					
Artemis (Helio)	7/15/10	Extended	9/30/2014 (+)					
STEREO	10/25/06	Extended	9/30/2014					
THEMIS	2/17/07	Extended	9/30/2014					
AIM	4/25/07	Extended	9/30/2014					Achieved bitlock 5/23 after 172 days(!)
Hinode	9/23/06	Extended	9/30/2014					
Cluster	7/16/00	Extended	9/30/2014 (+)					
ACE	8/27/97	Extended	9/30/2014					
RHESSI	2/05/02	Extended	9/30/2014					
SOHO	12/02/95	Extended	9/30/2014					
TIMED	12/07/01	Extended	9/30/2014					
Voyager 1 + 2	8/20/77	Extended	9/30/2014					
TWINS A + B	6/06 & 3/08	Extended	9/30/2014					
CINDI:C/NOFS	4/16/08	Extended	9/30/2014					
IBEX	10/19/08	Extended	9/30/2014					Lo in safe mode. Root cause analysis ongoing.
Wind	11/01/94	Extended	9/30/2014					
SDO	2/11/10	Prime	2/11/15					



Mission proceeding to meet science requirements



Area of concern - possible reduction in capability



Significant problem - possible or probable loss of mission

SAMPEX Re-entry

- The Solar, Anomalous, and Magnetospheric Particle Explorer (SAMPEX) is the first Small Explorer (SMEX) mission and was designed to study the energy, composition, and charge state of four classes of charged particles that originate beyond the Earth and that, ultimately, populate our Earth's radiation belts.
- The extended science mission was officially terminated in May, 2004, but SAMPEX operations have nominally continued for educational and outreach purposes. It is currently operated as an E/PO effort at Bowie State.
- It is non-maneuverable; the mean nominal predicted re-entry date of mid-October 2012. SAMPEX will be operated until atmosphere-induced tumbling prevents data collection. The prediction is that the spacecraft will totally demise upon re-entry with negligible/zero public risk.
- **Operational milestones from launch:**
 - **July 3, 1992** – Launched from Vandenberg Air Force Base on a Scout G-1 rocket
 - July 1992 to October 1997 – Primary Mission Science Operations at NASA/GSFC
 - October 1997 to Present – Extended Mission Science Operations at Bowie State University
 - May 2004 – Mission termination
 - **October 12, 2012 – Baseline Predicted Re-entry Date**

